

ANNUAL REPORT

ON THE

MEDICAL RESEARCH
INSTITUTE

FOR THE YEAR

1919.



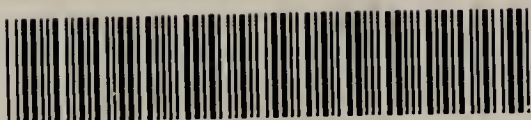
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Annual Report on the Medical Research Institute for the year 1919.

The eleventh Annual Report is presented herewith.

It is with the deepest regret that the death of Harold Sinclair Coghill, Assistant Bacteriologist, is recorded. He died in England towards the end of January.

Dr. Coghill joined the West African Medical Staff in 1907. During his first leave at home he developed Blackwater Fever. After his recovery he was seconded as Demonstrator at the London School of Tropical Medicine. He left the School to take up the appointment of Assistant Bacteriologist at the Medical Research Institute in 1911. Thereafter in 1913 he was seconded to the Gold Coast under the Yellow Fever Commission. When that Commission ceased its labours, he returned to the Medical Research Institute.

It is difficult to render adequate acknowledgment of his gifts as a research-worker. Thoroughness and extreme care characterised his methods. His interest and enthusiasm for his particular branch of Medicine were patient and controlled, but unflagging. With calm reasoned judgment he made theories accord with facts. He had the ideal temperament for experimental medicine.

Added to these were a lovable disposition, a kindness of heart, and a loyalty to his friends and to his profession which made him a friend to be proud of indeed. The West African Medical Staff has suffered a sad blow and Medical Research is greatly the poorer by his early death.

The Director was on leave from 22nd February until 10th October.

The Institute was fortunate in securing Dr. W. S. Clark to take charge during the interim.

Mrs. Summers Connal again undertook the Entomological work in the earlier and in the later part of the year.

Mr. S. A. Cardoso, 2nd Class Clerk was on duty the whole year and rendered good service.

The post of Laboratory Attendant remained vacant.

In the body of the Report will be found further notes on the Chronic Dysentery cases, and the Leper cases described in the previous year. There is also an account of a short search for the bacilli of Dysentery.

The usual abstract from the reports on Blackwater Fever forwarded by the Medical Officers, is included.

The bacteriological analysis of the Iju Water Supply was conducted regularly. The actual results have been furnished to the Water Engineer and to the Senior Sanitary Officer, and are not detailed herein.

Meteorological observations have been made daily and forwarded to the Department concerned.

A. CONNAL,

Director, Medical Research Institute.

YABA, Near Lagos,

14th April, 1920.

CHRONIC AMŒBIC DYSENTERY.

The Report for 1918 contained the results of a considerable amount of work done on the subject of Chronic Dysentery.

The difficulties of treatment were mentioned and the cases were sorted out into three groups, namely those definitely cured, those improved and those not improved. It was hoped that by the end of another year more accurate results could be recorded. In a sense, this has been done, but in that space of time, also, several patients have disappeared, some are in other parts of this Colony, and a few are in other Colonies.

Group I contained 15 cases in which cure was effected, under suitable dieting, Emetin hypodermically and Alcresta by the mouth. Three of these patients have left the Colony. The others have remained well, and the stools of these have been re-examined.

As regards Group II which embraced 6 cases, in which improvement occurred but not complete cure, cases A. (W.I.), B. (E.T.S.) and C. (S.C.) have now been cured and consequently go up into Group I.

Of the other 3, one died of influenza whilst undergoing the treatment, one has retired on pension and the third is out of the country.

Group III was made up of 9 cases in which both cysts and signs of intestinal irritation persisted. Further treatment on the lines followed in the other cases resulted in the cure of (a) H.U. (e) M.N. (f) L.Y. (g) B.E. (h) R.O. and (i) M.A. Case (b) J.A. was examined at home on five occasions and cysts were once found. He is much improved in health and can now be raised into Group II. As regards cases (c) M.L. and (d) W.L. no news can be obtained of them.

On the whole, the results are satisfactory. Out of fifteen cases treated and cured in 1918, twelve have remained well throughout 1919 and the other three have been lost sight of. Out of 6 cases improved, three were cured early in 1919 and have remained well and the other 3 cannot be traced up till now.

Out of 9 cases which were not improved in 1918, six were cured early in 1919, one was greatly improved and two have disappeared. The total of cures is thus twenty-one out of the original 30 cases eight of which have not been followed up.

Owing to the absence of both the observers on leave for the greater part of the year, little other noteworthy work was done on this subject. It remains to be added that in the search for cysts, the method of concentrating these from the faeces, described in The Lancet February 3rd, 1917, by Cropper and Row was found to be very useful in practice and was always followed before definitely concluding that the stools were free.

RESULTS OBTAINED DURING AN INVESTIGATION OF FAECES FOR THE BACILLI OF DYSENTERY.

The possibility of the occurrence of bacillary Dysentery has always to be borne in mind. So far as the investigations at this Laboratory are concerned no single case has been diagnosed. It must be confessed however that until the present investigations were begun no bacteriological examination had been made. Up till this time the finding of *E. histolytica* in the faeces and the response of the patient to Emetin or other drugs were held to be sufficient in most cases to justify the diagnosis of Amoebic Dysentery, and in the few remaining cases where no entamoebæ were found on examination of the stool, the after-history of the patient in no instance suggested the presence of the bacillary variety. However, in view of the return to Nigeria of many

men, both Native and European from various fields of war, where Bacillary Dysentery undoubtedly occurred, it was deemed advisable to make a routine bacteriological examination of every specimen of faeces received from cases where the symptoms were those of intestinal irritation.

McConkey's Bile Salt Agar, containing 2% lactose, and with Litmus as an indicator was used for the isolation of the dysentery bacilli from the stool. A small quantity of the faeces was shaken up to make a fine emulsion in 10 c.c. of normal saline, and two plates of the medium were inoculated from each specimen. Any colonies which had not acted on the lactose within two days were picked out and grown on Agar slopes. After 3 days' growth they were again plated out on the special McConkey medium and if still unable to ferment lactose were sown into the various liquid sugar media.

These were Glucose, Lactose, Saccharose, Mannite, Dulcitol and Maltose. This line of investigation was started in the middle of October. Up till the end of the year, faeces from 62 individuals had been examined, and in no case had any of the bacilli of Dysentery been isolated. The total of 62 included 25 Europeans. In 9 out of the 25, *Entamoeba histolytica* was definitely recognised, in the vegetative form in 8 and in the cystic stage in one; in 5 there were amœbæ of a type that in the absence of cysts precluded a definite identification but which all rapidly responded to Emetin; in one there were *Lamblia* free and encysted (free and encysted *Lamblia* also occurred in one of the 8 cases which showed free *E. histolytica*) and in 10 there were no pus cells, no epithelial cells, no red-blood cells and no protozoa. Of these ten, one was a case of subtertian Malarial Fever, which cleared up rapidly under Quinine. Three of the remaining nine were members of one mess who went down simultaneously with diarrhoea and they, in common with the other 6 in all probability suffered from some form of food poisoning, as in every instance a rapid cure was effected by simple non-specific treatment. As a matter of fact most of the ten cases just enumerated would have passed unnoticed in a country where slight attacks of diarrhoea are a frequent occurrence, had not particular attention been directed to such cases. Thirty-seven cases were in natives and of this number, 24 were male inmates of the neighbouring Lunatic Asylum. It was thought that if Bacillary Dysentery were at all common, some carriers might be found in them. They all except one harboured one or more of the following worms, as evidenced by the ova or the larvæ, *Ascaris*, *Ankylostome*, *Trichuris*, *Tænia*, *Strongyloides* and *Oxyuris*. Some were hosts of as many as four of these different parasites. As regards the protozoal findings 9 were carriers of *Entamoeba histolytica* usually in the vegetative as well as in the encysted stage, one harboured *Tetramitus* and another harboured amœbæ the identity of which could not be established, along with *Trichomonas*. Cysts of *E. coli* were commonly formed in the remainder.

The last group is made up of 13 natives, inhabitants of Lagos, of whom eight definitely suffered from amœbic Dysentery. In two others, amœbæ were found which were not identified. These ten patients responded quickly to Emetin or Amœbiasine. The remaining three suffered from some form of intestinal irritation which passed off quickly under suitable treatment.

BLACKWATER FEVER.

Reports on twenty-eight cases of Blackwater Fever have been received through the courtesy of the Medical Officers under whose care the patients came. These reports are furnished on a printed form and considerable pains have been taken to supply the information required as fully as possible. In spite of the interest directed to this end, many of the histories are incomplete, for reasons which include scarcity of Medical Officers, and the neglect or inability of some patients to send for medical assistance.

The cases are equally divided between the Northern and the Southern Provinces, there being fourteen from each. The incidence therefore is higher in the former as its European population is less.

With two exceptions the patients were males. The nationality was British in twenty-three, and of the remainder there were one French, one Portuguese, one Russian, one Eurasian, and one native of Nigeria. Seventeen patients were non-officials. Seven of these were engaged in trade, five were attached to the tin mines, two belonged to the Mercantile Marine, and three were Missionaries.

The Government officials numbered eleven, and included four Railway employees (two Engine Drivers and two Foreman Platelayers) three members of the West African Frontier Force, one Assistant District Officer, one Marine Engineer, one Public Works official and one native Police Constable.

The age is given for 27 patients. It ranged from 22 to 50 years as follows, 22, 25, 26 (3), 27 (2), 30 (3), 32 (2), 33 (3), 34, 35 (2), 36 (2), 37 (3), 40, 43, 46 and 50. The age period 30-40 years embraces most of the patients, as it also embraces most of the European official population, (*vide* Table No I, Vital Statistics of Non-Native Officials, West Africa, Returns for 1918).

The months in which the cases occurred were January 3, March 2, April 4, May 1, June 1, July 3, August 2, September 2, October 4, November 2, December 4.

Three months (November, December, January) of the dry season contain 9 cases, five months of the rainy season (March, April, May, June, July) contain 11, and three months of the "small rains" (August, September, October) contain eight.

The stations in or near which the disease manifested itself were Naraguta 5, Lagos 4, Kano 3, Zaria 2, Oshogbo 2, Enugu 2, and one each in Baro, Bonny, Forcados, Ibadan, Kabba, Lokoja, Ogoja, Port Harcourt, Udi and Zungeru.

The period spent in West Africa varied from two weeks to eighteen years. The actual figures are 2 weeks, 8 months, 9 months, 2 years (4), $2\frac{1}{2}$ years, 3 years (2), $3\frac{1}{2}$ years (4), 4 years, 5 years (3), 7 years (2), 8 years (2), 9 years (3) 12 years and 18 years. The native policeman aged about 36 years had never left the colony. Nine of these patients had spent a part of of their life in other malarious countries. Three who had spent two years in West Africa had lived one the rest of his life in India (age 43), another two years in Malta and the third some months in Gallipoli. One who had spent $2\frac{1}{3}$ years in West Africa had lived 3 years in India and 2 years in Burma. Another who totalled 3 years in West Africa had been in Uganda for $3\frac{1}{2}$ years and had been fighting 4 years in Cameroons and East Africa. One who had accumulated 4 years in West Africa, had been in Malay 3 years. Of two who had lived 5 years in West Africa one had been $4\frac{1}{2}$ years in South America and the other 2 years in India. The ninth, who had 9 years in West Africa to his credit had also had some years' service as a soldier in India.

When it is added that the patient who had been about two weeks in the country and the one who had been nine months, were both sea-faring men concerning whose previous wanderings no information was available, it will be readily seen that there was ample time in 27 cases to become impregnated with Malaria.

The first patient on the list, who had spent 8 months in Nigeria and who had two attacks of Blackwater Fever in that space of time, one at 5 months, had been in the Army since 1914 but it is not known in what theatres of war, malarious or otherwise, he had been serving.

As regards the period of continuous residence in West Africa, that is the length of the tour, the shortest was two weeks and the longest 7 years. The individual figures are 2 weeks (2), 3 months, 4 months, 5 months (2), 6 months, 7 months (2), 8 months, 9 months (3), 12 months (2), 14 months (3), 17 months, 2 years (3) $2\frac{1}{2}$ years, 3 years, $3\frac{1}{2}$ years (2) and 7 years, excluding the native policeman.

There is a history of previous malaria in 26 cases. In no case is the diagnosis based on the demonstration of parasites in the blood. The information, for the most part, was given by the patients themselves, but it was probably correct. The particular chain of signs and symptoms due to malaria is familiar to most Europeans in West Africa.

Eight patients had previously suffered from Blackwater Fever. Three of these had had two previous attacks. In one of these three the first attack was 4 years and the second, one year before the present; in another the dates were very nearly similar, $4\frac{3}{4}$ years and $1\frac{1}{4}$ years, and in the third case no dates were given. In the other five cases there had been one previous attack, respectively 7 years, 6 years, $2\frac{3}{4}$ years, 14 months and $2\frac{1}{2}$ months before the present. Two of these patients died, the second and the last of the above five.

The habits as regards Quinine prophylaxis against malaria are noted in all the cases save two. Those patients who stated that they took Quinine regularly number eight. The routine was respectively, Hydrochloride grains $2\frac{1}{2}$ six days in the week, Hydrochloride grains 5 daily, Bisulphate grains 5 daily (3), "Grains V regularly," "Grains IV every second day," and "Grains V daily." It is not stated if the dose was taken in tabloid form or in solution.

The remaining seventeen patients admitted to irregularity or entire disregard of prophylactic doses of Quinine.

Concerning the administration of Quinine shortly before the onset of hæmoglobinuria, information is given regarding eighteen cases. In the case of the native policeman he stated definitely that he had taken no Quinine, and similarly with Case 8, a Russian Sailor.

In two cases the usual prophylactic dose preceded the hæmoglobinuria; in one, grains $2\frac{1}{2}$ of the Hydrochloride preceded the blackwater by 5 hours and in the other the drug was Bisulphate grains V and the interval less than twelve hours. The data for the other fifteen are tabulated for the sake of brevity and clearness.

Salt.	Dose in Grains.	Interval.
Hydrochloride	X	a few hours.
"	X in solution thrice daily for 3 days	a few hours.
"	X	2 hours.
"	V in solution twice in 1 day	$1\frac{1}{2}$ hours.
"	V thrice in 1 day	about 12 hours.
"	V four-hourly 1 day	a few hours.
"	XX	12 hours.
Bihydrochloride	V four-hourly, 3 days	a few hours.
Sulphate	V morning and evening on each of 2 days	3 hours.
Bisulphate	V	10 hours.
"	XX	6 hours.
"	XV	a few hours.
"	X in solution twice daily for 2 days	$8\frac{3}{4}$ hours.
?	XX in V grain doses for 1 day	a few hours.
?	X	a few hours.

No attempt has been made to co-relate other possible etiological factors. Accurate figures of Malaria are impossible to obtain. No one bloodsucking insect has been found to be common to all the stations where cases occurred and absent from other stations, and no evidence of direct or indirect infection from one patient to another, or of more than one patient within a short period in one station has been remarked.

In twenty-one cases data are given concerning the onset.

Case (2) played Polo in the evening, had severe diarrhoea and some vomiting during the night, and in the morning passed black water.

Case (4) felt fatigue on the three evenings previous to the actual onset of hæmoglobinuria.

Case (5) got a wetting while over-seeing the coaling of his ship. At 1 p.m. of that day felt cold. At 7 p.m. took five grains Quinine, and some brandy. Thereafter a severe headache developed, several rigors occurred, he had pains over the body generally, most severe in the lumbar region and passed red urine at 2 a.m.

Case (6) felt as if he had a malarial attack on 3rd April. On 6th April was no better, had pains in his loins and took ten grains Hydrochloride of Quinine. A few hours later he passed black water.

Case (7) felt out of sorts for two days, and on each day took five grains Quinine Sulphate, morning and evening. Blackwater appeared three hours after the last evening dose.

Case (9) had an attack diagnosed Malarial Fever for three days on each of which he took ten grains Quinine Hydrochloride thrice in the day. Black water was first noticed a few hours after the 9th dose.

In Case (10) there were three severe rigors with pain in the small of the back. Ten grains Quinine Hydrochloride in solution were taken at once and the typical urine was passed two hours later.

Case (11) felt ill, found his temperature 102°F, took four doses each of five grains Quinine during the day and noticed black water next morning.

Case (12) took his usual five grains of the Bisulphate of Quinine in the evening. Next evening he "felt he had a high temperature" and the urine which he passed then was black. There were no other signs of illness and in six hours the urine was clear again.

In Case (13) the attack was sudden, associated with pains in the back.

Case (15) was admitted to Hospital on 9th August, complaining of weakness and repeated attacks of "low fever". The temperature on admission was 98°F. He was anæmic and constipated. Iron and Strychnine in tonic doses were given. There was no fever until 7 p.m. on 11th August when the temperature registered 100°F. There was no other rise noted until 3 p.m. on the 12th when the temperature was 99°F. It fell to normal again. On 13th August he was given five grains Quinine Hydrochloride in solution twice in the day. The temperature remained normal until 8.30 p.m. on that day when it rose to 102°6 F.

There was a severe rigor and some vomiting. At 9.30 p.m., 1½ hours after the second dose of Quinine he passed black water.

In Case (16) the attack was sudden. She was well enough on the previous day for an eight hours' train journey.

Case (17) took 20 grains Bisulphate of Quinine in the evening as she "felt an attack of Fever coming on". Six hours later she passed black water.

Case (19) felt ill with "fever" on 8th October. Took fifteen grains Quinine Hydrochloride on the 9th. Noticed the urine red on the morning of the 10th of October.

Case (20) observed his urine red on the morning of 16th October and concealed his illness until the following day.

Case (21) also received his first warning in the appearance of black water but went at once to Hospital.

Case (22) was seen on 27th October by the Medical Officer. The temperature was 104°·4 F, the tongue was coated, the skin dry, and the liver and spleen enlarged. He was given Quinine Hydrochloride five grains every four hours. Next morning, within 12 hours of last dose of Quinine he passed black water.

Case (23) felt ill for some 8 hours (early in which period, he took ten grains Quinine) before he first voided red urine.

Case (24) was on trek. He felt unwell on the evening of 26th November, so he took 20 grains Quinine Hydrochloride and went to bed. Next morning he got up to resume his journey but altered his mind when he noticed his morning urine was black.

Case (26) felt unwell for several days previous to the onset of hæmoglobinuria.

Case (27) was ordered Quinine Bisulphate grains x in solution daily, two days before the appearance of black water. He probably exceeded the dose. The final dose was taken at 7 a.m. on 10th December. He was admitted to Hospital two and a half hours later, and black water was passed at 3.45 p.m. on the same day.

Two facts emerge from the histories. One is that black water may be the first sign of illness. The other is that both subjectively and objectively the initial manifestation may be indistinguishable from Malaria.

Pyrexia characterised all the cases. Jaundice is mentioned as having been present in fourteen patients, absent in five, and is omitted from the history in the remainder. Vomiting is noted in twenty cases, there was no vomiting in four, merely nausea in one, and no note in the remaining histories. There were rigors in thirteen of the cases, no rigors in two, and no note of this sign in the others. As regards pain, a sense of fatigue is mentioned in one, headache is recorded in two and no pains at all in three cases. The pain was in the loins, or across the kidneys, or in the lumbar region, or in the back, or in the small of the back in 7, and there was epigastric pain in two instances. No note of this symptom is made in the others.

An enlarged spleen is note in six cases, no enlargement in three and there are no notes regarding this in the remainder.

Hiccough is noted as having occurred in five cases of which three died. It was noted as absent in seven cases and in the others is not recorded. Diarrhoea was present in seven patients, definitely absent in eleven, there was constipation in one, and the state of the bowels in the others is not given in the notes.

Case (15) developed Oedema of face, neck and chest as the urine was clearing, but getting less in amount.

Case (19) had a syncopal attack on the 2nd day of the disease and had three attacks of trigeminal neuralgia in the early stages of convalescence.

Case (27) had suppression of urine on the 3rd and 4th days of illness, and thereafter had polyuria with a considerable deposit of pus in urine. As regards remissions or relapses they were definitely absent in 20 cases.

In Case (4) there were three relapses, the days being the 7th, 8th, and 9th after onset. In Case (14) there were two relapses, one on the 7th and the other on the 8th day. In Case (18) there were six remissions during the ten days of hæmoglobinuria.

In Case (19) there was a remission on the 2nd day and a relapse on the 11th with a remission on the 12th. All of these four cases recovered. The notes in the remaining four make no mention of relapses or remissions. The duration of hæmoglobinuria varied from six hours to thirteen days. It was six hours in one case, two days in four, three days in four, four days in six, five days in two, six days in five, and seven, eight, ten and thirteen days in one case each. Or, if relapses be excluded, the periods are six hours in one, two days in five, three days in five, four days in six, five days in two, six days in three and the seven, eight, ten and thirteen day periods in one case each. The latter calculation is shown graphically below, from two up to eight days' duration.

Four days is the commonest period in this series of cases and the average period of hæmoglobinuria (excluding relapses) in 26 cases is nearly $4\frac{1}{2}$ days.

DURATION OF HAEMOGLOBINURIA IN DAYS.

Cases.	2 days.	3 days.	4 days.	5 days.	6 days.	7 days.	8 days.	Cases.
6			°					6
5	°	°						5
4								4
3					°			3
2				°				2
1						°	°	1

The duration of the three relapses in Case (4) was one day each similarly with the two relapses in Case (14) and it was 2 days in the single relapses of Case (19).

The number of deaths was eight. The ages in these fatal cases were 22 years, 26 years, 34 years, 35 years, 37 years, (2) 43 years and 50 years. Two had been less than a year in West Africa. The others had been two years or longer. The periods of continuous residence, that is without having been on leave in non-malarious country were two weeks, five months, six months, seven months, eight months, nine months (2) and twelve months. Four had lived elsewhere exposed to malaria than in Nigeria; one had spent four years fighting in East Africa and Cameroons and had also spent $3\frac{1}{2}$ years in Uganda, one had been fighting in Gallipoli, one had spent the rest of his life in India and the fourth had spent some years soldiering in that country. All had previously suffered from malaria. All either neglected Quinine entirely or took it at irregular intervals.

Two had previously suffered from Blackwater Fever, one $2\frac{1}{2}$ months and the other 6 years before the present attack. Death occurred in the actual hæmoglobinuric stage of the disease in six, the duration of the disease having been two days in two, three days in two, four days in one and five days in the sixth case. The pyrexia was high in five and moderate in three. Jaundice was present in seven there being no note of this sign in the report of the 8th case. Vomiting occurred in all, noted as "severe" in two, "frequent" in one and "persistent" in one. Hiccough was noted in three and diarrhoea in four cases. These and other data are noted in the table below.

PARTICULARS IN EIGHT DEATHS FROM BLACKWATER FEVER.

Present tour.	Age.	Sex.	Occupation.	Residence in W.A. Total.	Residence elsewhere in tropics.	Previous B.W.F.	Duration of Haemoglobinuria.	Fever.	Jaundice.	Vomiting.	Hiccough.	Diarrhoea.	Duration of illness.
8 months	22	M	Sergeant	8 months	?	2½ months previously	2 days	High	Deep	Severe	Present	Present	3 days
5 months	37	M	Merchant	3 years	East Africa Uganda, Cameroons 7½ years.	No	5 days	„	Present	Present	?	„	5 days
7 months	43	M	Marine Engineer	2 years	India, lifetime	No	3 days	„	„	Severe	Present	„	3 days
2 weeks	34	M	Foreman P.W.D.	8 years	No	No	6 days	„	„	Present	?	?	13 days
9 months	26	M	Merchant	3½ years	No	No	2 days	Mode- rate	?	„	?	?	2 days
6 months	35	M	Tin Miner	2 years	Gallipoli some- time	6 years previously	4 days	„	Present	Frequent	?	?	4 days
12 months	50	M	Foreman Platelayer.	9 years	India some years	No	3 days	High	„	„	Present	No	3 days
9 months	37	M	Mercantile Marine	9 months	?	No	5 days	Mode- rate	„	Persist- ent	?	Present	14 days

The results of a search for malarial parasites are noted in 21 cases. The blood was examined on the first day of hæmoglobinuria in 6 patients and no parasites were observed in any. In blood smears taken from seven on the 2nd day, no parasites were found, three out of the seven having been examined on the first day also.

A blood examination was made in six cases on the 3rd day. Subtertian rings were found in one case which had not been previously examined. The others were negative: two of them had been examined on the 1st and 2nd day and three on the 2nd day.

A search on the 4th day of hæmoglobinuria was made in six cases, with negative results, two of these cases having been examined then for the first time.

Three cases were examined on the fifth day and two on the sixth day, with negative results. The above figures concern thirteen individuals. In the remaining eight cases the day of illness is not noted and there is merely the statement "no parasites found".

In one of the cases in which no parasites were found on the 1st day, there was a heavy subtertian infection 36 days later.

A differential leucocyte count was made in nine cases on twenty-four smears taken on different days of illness. These counts were done at the Medical Research Institute.

The figures are inserted in a table, showing the changes of count in the individual on the different days of illness.

Day.	Poly morph.	Small Lymph.	Large Lymph.	Mono nuclear.	Eosino-phil.	Transi-tional.	Myelo-eyte.	Mast cell.	Normo-blast.	Other findings and remarks.
1st. 2nd. 3rd. 4th.	74.4 55 55.2 72	10.2 14.8 24.8 9.4	1.8 3.6 4.4 2.6	9.6 19.2 5.8 13	0.6 5 6 0.8	2.4 2.4 3.8 2.2	0.8	0.2 ... ... ...	... ... ... ...	No parasites found. Had Blackwater 7 years previously. Present attack uncomplicated.
1st. 2nd. 3rd.	53.8 56 64.2	13.2 17 8.2	5.8 5.6 3.4	19.8 16 18.6	... ... ...	5 2.8 4	2.4 2.6 1	... ... ...	... ... 0.6	One erythrocyte in 500 leucocytes on 1st and 2nd days. No parasites. Uncomplicated.
1st. 2nd.	64.6 70.6	15.8 13.6	4.2 3	11.4 7.4	0.6 0.2	2.4 3.2	1 2	... ...	... ...	No parasites. Uncomplicated.
1st.	60.6	9.2	2.6	22.2	0.4	4.8	0.2	...	...	One erythrocyte in 500 leucocytes. Fatal case.
2nd. 3rd. 4th. 5th.	73.4 69.8 55.2 73	11 12.2 15 14	3.4 2.4 3.6 2	6.8 10.6 18.6 5	0.2 ... 0.4 0.6	1.6 2.2 4.8 1.2	3.6 2.8 2.4 3.8	... ... ... ...	... ... ... 0.4	Two erythrocytes and one pigmented Mono in 500 leucocytes on 3rd day and one erythrocyte on 4th, Blackwater previous year.
2nd. 3rd. 4th.	64.4 66 62.4	12.6 11.8 15.8	5 4.4 2.8	9.8 12.2 10.8	0.6 0.4 0.2	3.6 1.6 3.2	1.8 2.6 3.6	... ... ...	2.2 1 1.2	Uncomplicated case. No parasites.
2nd. 3rd.	50.8 76.8	20.2 8.6	6.4 2.6	20 7.6	... ...	2 3	0.4 1.4	0.2 ...	... ...	Six erythrocytes on 2nd and 2 on 3rd day in 500 leucocytes. No parasites. Uncomplicated.
3rd. 4th.	67 72.2	10.4 9.8	1 1.6	16.4 7	... 0.2	4 6	1.2 3.2	... ...	... ...	Subertain rings on 3rd day. Fatal case.
4th. 5th. 6th.	66.8 62.8 50.2	14 20.6 19.8	3.8 4 4.8	10.4 5 15.2	0.2 0.4 2.2	3 2.8 6.4	1.8 4.2 1.4	... 0.2 ...	... ... ...	Six erythrocytes on 4th day. Embryos of A perstans on 5th day. Native case.

It remains to be noted that inequality in the size and shape of the red cells, polychromasia and basophilia characterised the blood smears examined, these changes being more marked in the later than in the early stages of the disease.

The data of all the cases except as regards the blood examination are tabulated for the sake of convenience.

LEPROSY.

The progress of fifteen lepers, voluntary inmates of the Yaba Leper Asylum is now recorded. Their previous history is given in the Annual Reports from 1916 onwards.

Only three patients received medicinal treatment. The condition of the remaining twelve appeared to justify their being kept merely under observation and in good hygienic surroundings. In none of these twelve were any active signs of the disease manifest during the year under review, except as noted below.

The three cases which received medicinal treatment were (1) L.A. (No. 2 of 1916, and L.A. of 1917 and 1918) (2) O.G. (1917 and 1918) and (3) C.A. (1917 and 1918).

Case L.A. showed improvement under *Reiser's* treatment during 1915. Improvement continued during 1917 and up to September, 1918, under the administration of Gynocardate of Soda. On 30th September, 1918, the only sign of active disease was an impairment of sensation in the lower two-thirds of both legs. At the end of 1918, sensation appeared to be complete, but a few small tubercles had re-appeared on various parts of the face. There was also swelling of the right index finger.

During the first three and a half months of 1919 he received weekly injections of Gynocardate of Soda, and of Nastin B.I. The Gynocardate was given intravenously in a dose of grains iii on the Tuesday and the Nastin subcutaneously in a dose of 1.c.c. on the Friday of each week. After two and a half months the dose of Gynocardate was increased to grains iv and a fortnight later it was increased by another half-grain. At the middle of April the supply of Gynocardate was exhausted. A note on 1st June, 1919, reads "no noticeable change" so that apparently the progress of the disease was held in check.

By 14th October, 1919, there was marked retrogression. The leonine facies had returned. The nodular condition of the face was again in evidence. The terminal phalanx of both index fingers was swollen. There was "nibbling" of all the toes. On 27th November further signs of relapse were oedema of both feet, and three small ulcers on the right leg, one on the outer side of the ankle, one over the middle of the Tendo Achillis and the third on the calf.

At the end of the year, this patient's condition was very similar to that which obtained in 1916 before energetic treatment was begun.

Case O.G. Condition ameliorated by *Reiser's* treatment and also by Gynocardate of Soda during 1917. The improvement was maintained during 1918 under the Gynocardate. At the end of 1918 the only signs of active disease were a small ulcer at the base of the right second toe, and impairment of sensation in the left foot, and in the right leg from the lower third, downwards.

During the first $3\frac{1}{2}$ months of 1919, he received treatment on the same lines as in Case L.A. supra. During that time the maculæ disappeared and the ulcer healed. Some indefinite impairment of sensation remained. The condition was unchanged at the end of 1919.

Case C.A. The disease was said to be of seven months' duration when this patient first came under treatment in January, 1917. *Reiser's* mixture was tried for the first six months of that year, but without good effect. In the latter part of 1917 and for the first four months of 1918, Gynocardate of Soda was given intravenously; no improvement was noted. For the next five months of that year, May to September, he received Atoxyl subcutaneously and still the disease continued apparently unchecked. For the first $3\frac{1}{2}$ months of 1919, he was treated in the same manner as cases L.A. and O.G. above, no improvement resulting. At the end of 1919 medicinal treatment having been suspended

for $8\frac{1}{2}$ months, the leonine facies was pronounced, the nodular condition of the chin, lips, cheeks, nose, ears and forehead was advanced, the skin generally was thickened, there was a small ulcer on the tip of the left great toe, and he complained of shooting pains in the limbs.

As regards the remaining twelve cases, the following six showed no signs of active disease during the year under review, and indeed, for the most part improved in health and physique, B.O. (1917 and 1918), I.S. (1917 and 1918), L.M. (1917 and 1918), O.S. (1917 and 1918), P.A. (1917 and 1918), and S.H. (No. 3 of 1916 and S.H. of 1917 and 1918).

Case A.E. (1917 and 1918) showed a small ulcer on the stump of the right foot.

Case O.M. (No. 7 of 1916 and O.M. of 1917 and 1918) presented two ulcers on the stump of the left foot, one of which had healed before the end of the year.

Case D.K. (1917 and 1918) developed a small ulcer on the stump of the left foot.

Case D.A. (No. 1 of 1916, D.A. of 1917 and 1918) refused the Gynocardate and Nastin treatment. Double iritis was still present at the end of the year but showed signs of abating. Anti-rheumatic remedies, also Mercury and Pot. Iodid, were given for this condition.

Case A.K. (No. 5 of 1916 and A.K. of 1917 and 1918) received no medicinal treatment. No change was noted in his condition until November, when œdema appeared at the ankles and slowly spread up to the thighs and scrotum. A simple diuretic was prescribed and the œdema rapidly disappeared.

The condition at first was thought to indicate definite degenerative changes in the kidneys, which have been the cause of death in three previous cases.

Cases A.D. (1917). This patient had absconded in the latter part of 1918, and was not included in the report for that year. Early in 1919 he returned. No change was noted and the disease appeared to be arrested. It would appear therefore that in all the cases except one (C.A.) the intravenous administration of Gynocardate of Soda was the means of checking the progress of the disease, and indeed in six cases had definitely brought it to a standstill.

TUBERCULOSIS.

As noted elsewhere, Sputum from twenty-five individuals was examined. Tubercle bacilli were found in two Europeans in both of which cases it was decided that the infection had been contracted in England. The bacilli were also demonstrated in five natives, all of whom were inhabitants of Lagos.

No specimens of tubercular disease were received from the Slaughterhouse. From Calabar tracheal glands were sent for examination, which showed giant cells but no tubercle bacilli. This patient was a native of that town.

A specimen of tubercular pericarditis was received from Calabar also, from a native.

A thyroid cartilage, removed P.M. from a Hausa at Zungeru, proved to be tubercular.

TYPHOID FEVER.

Two cases occurred, in Europeans in Lagos, the infecting organism being *B. typhosus* in one (a fatal case) and *B. paratyphosus* B. in the other.

In Minna there was a case (European) of paratyphoid fever due to *B. paratyphosus* B, and at Kano a case of typhoid fever due to *B. typhosus*. These were the only instances in which material was sent for examination at the Laboratory.

MALARIA.

The few figures available are given under "Blood Examinations."

BLOOD EXAMINATIONS.

The number of blood smears examined was 188 of which 156 were from Europeans. Sub-tertian malarial parasites were found in 38 European cases, the form of the parasite being the ring in 36 and the crescent in two. Embryos of *Loa loa* were found both in the day and the night blood in one case. A differential leucocyte count based on the accepted standard of 500 leucocytes, was made on 32 occasions.

Blood smears were examined from 32 natives. Sub-tertian parasites were found in four, embryos of *Filaria bancrofti* in one, and of *Acanthocheilonema perstans* in one.

The following table gives an indication, by no means scientifically accurate, of the prevalence of malaria in the different months of the year.

The number of blood smears received at the Laboratory is a rough index of the cases of "Fever" in Lagos. Not all are malarial in origin, and furthermore a certain proportion of the cases are clinically malaria and are treated as such, without the formality of a blood-examination.

Bearing this in mind the figures in the table are given for what they are worth.

	Jan.		Feb.		Mar.		Apr.		May.		June.		July.		Aug.		Sept.		Oct.		Nov.		Dec.	
	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.
Neg	14	9	6	2	6	2	4	2	6	1	7	0	6	2	7	1	9	2	4	0	11	4	37	1
Subt.	3	0	0	0	0	0	0	0	0	0	1	0	4	0	3	0	3	0	2	0	6	3	19	1
%	21.5	0	0	0	0	0	0	0	0	0	28	0	66.5	0	43	0	33	0	50	0	55	75	51	100

E=European.

N=Native.

EXAMINATION OF FAECES.

The number of specimens of faeces examined was 211 from 169 individuals. The table given below shows the findings excluding those specimens in which only helminth ova were noted and those in which the findings were negative. The inclusion of these would make the table unwieldy. It will be seen that *Entamoeba histolytica* in the free vegetative stage, or encysted, or both, was found in 58 individuals. *Lamblia intestinalis* occurred in five, *Trichomonas* in two, *Cercomonas* in two and *Tetramitus mesnili* in one. Amoebæ not definitely identified were observed in 12 instances. There were neither ova nor protozoa in 36 cases.

The non-pathogenic *E. coli* and *E. nana* are not included in the table although they were encountered in several of the specimens. *Prowazekia* similarly is not mentioned although it was met with on some occasions. No infection with Bodo was recognised. *Balantidium*, although it occurs in Lagos was not found in any of the specimens examined. *Coccidia* were always looked for but were not observed in any instance.

As regards *Dientamoeba fragilis*, on several occasions in Giemsa-stained preparations, binucleate amoebæ were seen but they were not noticed in fresh smears or in wet-fixed Iron hæmatoxylin stained specimens. Many of the cases included in the above figures are more fully described in the two sections dealing with Chronic Amoebic Dysentery and with the search for the bacilli of Dysentery.

		European M. F.	Native M. F.	Total.
Entamoeba histolytica	... ..	5	6	13
" "	Lamblia ...	1	...	2
" "	" Cercomonas ...	1	...	1
" "	Ankylostome ova ...	...	1	1
" "	histolytica free and encysted ...	2	...	3
" "	" Ankylostome Ascaris Trichuris ova ...	...	2	2
" "	" " Oxyuris ova ...	...	1	1
" "	" " Taenia ova ...	...	1	1
" "	" Trichuris ova ...	...	5	5
" "	" Ascaris ova ...	...	2	2
" "	" Ascaris Trichuris ova ...	...	2	2
" "	" encysted ...	18	1	21
" "	Ankylostome Ascaris Trichuris ova ...	...	1	1
" "	Ankylostome ova ...	...	1	1
" "	Trichuris ova ...	...	1	1
" "	Ascaris ova ...	...	1	1
" "	Amoebæ ...	...	1	1
" "	Trichomonas, Ankylostome ova ...	6	2	11
Lamblia	...	...	1	1
Cercomonas. Ascaris ova	...	2	...	2
Trichomonas	...	1	...	1
Tetramitus mesnili. Ankylostome Ascaris Trichuris ova	...	...	...	1
Flagellate	...	1	...	1
Fungi (including Blastocystis)	...	3	1	4
Red blood cells, pus cells and epithelial cells only	...	3	1	7
Degenerated cellular elements, only	...	13	3	20
Mucus, only	...	9	2	11
Total	...	66	11	118

HISTOLOGICAL SPECIMENS.

Eight specimens of kidney were examined. There was cloudy swelling in three. Subacute glomerular nephritis was present in two, and catarrhal nephritis in one. One organ presented pyaemic abscesses and there was a general œdema in the last.

The conditions in seven specimens of lymphatic gland were congestion in two, fibrosis in two, typhoid infection in one, giant cells (tubercular) in one and a malignant adenomatous invasion in one.

There were six specimens of liver, showing cloudy swelling in two, fatty degeneration in one, cirrhosis in one, cysticercus in one and carcinoma in the last.

The four specimens of spleen exhibited congestion in two and fibrosis in two.

Three specimens of intestine were received. There was typhoid ulceration in one, dysenteric (amoebic) ulceration in the second and in the third there was a cysticercus adhering to the outer wall.

Two specimens of heart showed a tubercular pericarditis in one and a gumma in the other.

A specimen of lung presented the signs of catarrhal bronchitis.

A tonsil showed giant cells and chronic hyperplasia. Tubercle bacilli were demonstrated in a specimen of thyroid cartilage.

The tumours identified in specimens received were Ovarian cyst (two, one calcified), simple Adenoma of Thyroid (two), Nasal polypus, simple Mole, Myoma of uterus, Cavernous Angioma liver. Angioma foot, Fibroma foot, Epulis, Malignant Adenoma stomach, Malignant Adenoma, male breast (European), Sarcoma clavicle and Sarcoma forearm.

MEDICO-LEGAL.

In the absence of the Government Chemist, a number of samples were submitted to this Laboratory for analysis, but such procedure was not encouraged.

A stomach and its contents were examined but no poison was identified.

Three samples of poison were examined, one the "Edo Ekun" variety and some of its constituents were recognised. One of the other samples contained powdered glass or powdered quartz, and the third apparently contained no poison sufficient to kill a guinea-pig.

A collection of bones was received and proved to be human in origin.

HELMINTHOLOGICAL.

A specimen of *Teania saginata* was received from Lagos.

A male *Loa loa* (which issued from an incision for hernia) and some masses of *Onchocerca volvulus* were received from Minna.

A Guinea worm removed from the scrotum was sent from Owerri.

An adult female *Ascaris lumbricoides*, passed per urethram was received from Buea. The patient had a discharge from the urethra and had been attending the out-door dispensary for ten days. After an injection of Potassium Permanganate he complained of violent pain, with a desire to micturate, in the act of which the worm was passed. The urethritis then cleared up.

PUBLIC HEALTH.

A few samples of organs from the Slaughterhouse were submitted by the Medical Officer of Health.

Four specimens of liver from sheep contained *cysticercus tenuicollis*.

Two specimens of lung and one of liver showed an appearance of miliary tubercle but neither giant-cells nor tubercle bacilli were observed.

Two specimens from cows were received, one a stomach which contained numerous *Amphistomes* and the other a lung showing cavities which were not tubercular in origin.

One specimen of lung from a pig was also negative as regards tubercle bacilli.

Twenty-six bacteriological analyses of water were done. The samples came from various sources, mainly the Iju Water Supply, and also from the Challawa, Kaduna and Ogun rivers and from Soda-water factories. In the case of the rivers, the analyses were done in connection with experiments on the untreated and the alum-treated waters.

MISCELLANEOUS SPECIMENS.

SPUTUM.

Twenty-five specimens of sputum were examined. Tubercle bacilli were found in seven instances, two from Europeans and five from Natives.

Spirochaetes and red blood cells were found in the sputum of a native girl.

URINE.

Nine samples of urine were examined microscopically and bacteriologically. Pus cells were present in eight, the accompanying organisms being for the most part *B. coli*, diplococci or staphylococci.

The Widal test was performed with ten sera. The result was positive to *B. typhosus* in two cases and to *B. paratyphosus* in other two. In the remaining six instances it was negative.

Cerebrospinal fluid was examined from four cases. The meningococcus was present along with pus and clot in two.

Swabs from the posterior naso-pharynx of twelve contacts with one of the cerebro-spinal fever patients were examined, but the meningococcus was not isolated from any.

Other material included two gland smears both negative, two tonsil swabs, one of which showed Vincent's bacilli and *spirochaetes*; pus from a knee-joint, pus from an empyema, scrapings from the skin, and a smear from the spleen.

Amongst the lower animals, blood smears were examined from four houses.

Trypanosomes were present in two. The blood of a hyaena also contained trypanosomes.

Caseating tumours from three fowls were examined with no noteworthy findings.

The brain and cord of a horse which had suffered from a rabies-like attack showed no Negri bodies.

ENTOMOLOGICAL.

Mosquito larvae collected by the Sanitary Inspectors on their daily rounds were sent out for identification, through the kindness of the Medical Officer of Health.

Sixty-three collections were received in January and sixty-two in February, a total of one hundred and twenty-five.

Only six species occurred in these 125 collections and as usual there was a great preponderance of *Stegomyia fasciata*, these larvae

occurring 70 times, 42 in January (out of 63) and 28 (out of 62) in February. The percentages are for January 66·66, for February 45, and for the two months fifty-six.

Culiciomyia nebulosa was the next commonest, having been found in 17 collections in January (27%) and in 26 collections in February 42%, and for the two months 43 or 4·4 per cent.

Ochlerotatus irritans was noted in nine samples, *Culex decens* in two, *Anopheles costalis* in one and *Uranotaenia annulata* in one.

The table gives the particulars and also gives an indication of the favourite breeding places, *Stegomyia* and *Culiciomyia* as usual preferring household receptacles, and Crab-holes giving hospitality to *Ochlerotatus* and *Uranotaenia*.

The following mosquitos were received from Hadeija in October, *Culex decens* 1 ♂ 9 ♀, *Anopheles costalis* 3 ♀ *Stegomyia* Sp. 1 ♀.

From Lagos in October also, there were received *Culiciomyia nebulosa* 3 ♂, *Culex tigripes* 2 ♀, *Culex decens* 1 ♂ 1 ♀, *Ochlerotatus irritans* 1 ♂ 1 ♀ and *Ochlerotatus nigricephalus* 1 ♀.

Two specimens of *Glossina palpalis*, caught in the Laboratory were dissected. In the stomach of one, there were mammalian red cells, some of which contained *Piroplasma*, and there was also an unsheathed stumpytailed filarial embryo.

A larva removed from a sore on the leg was identified as *Cordylobia*.

Two larvae which had been vomited, were those of a Muscid.

Receptacle.	Larvæ.					January.	February.	Total.
Agbo pot	<i>Culiciomyia</i>	<i>nebulosa</i>	...	...	...	10	21	31
Barrel ... ..	"	"	...	...	...	1	...	1
"	<i>Stegomyia</i>	<i>fasciata</i>	...	...	...	3	...	3
Bucket ... ..	"	"	...	...	...	1	2	3
Calabash ... ..	"	"	...	...	...	...	1	1
Cance ... ..	"	"	...	...	...	...	1	1
Catchpit ... ..	"	"	"	...	...	2	...	2
"	<i>Anopheles</i>	<i>costalis</i>	...	...	...	1	...	1
"	<i>Ochlerotatus</i>	<i>irritans</i>	...	...	...	1	...	1
"	<i>Culiciomyia</i>	<i>nebulosa</i>	...	...	...	2	1	3
Cooler ... ..	"	"	...	...	...	3	2	5
"	<i>Stegomyia</i>	<i>fasciata</i>	...	...	...	36	23	59
Crab-hole	<i>Ochlerotatus</i>	<i>irritans</i>	...	...	...	1	6	7
"	"	"	<i>Culex decens</i>	...	...	1	...	1
"	<i>Uranotaenia</i>	<i>annulata</i>	...	...	...	...	1	1
Drum	<i>Stegomyia</i>	<i>fasciata</i>	...	...	...	...	1	1
"	<i>Culiciomyia</i>	<i>nebulosa</i>	1	1
Dustbin	"	"	1	1
Dye Pot	"	"	(Psychodids)	1	...	1
Well	<i>Culex decens</i>	1	1
Total						63	62	125

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